The SEL Adapts to Meet Changing Times

Rose Pajerski, NASA GSFC

Victor Basili, University of Maryland

Presentation Outline

- Drivers for Change

- Organizational Adaptation

- Experimentation Adaptation

- Technology Transfer Adaptation

- Next Steps

Drivers

- **NASA Strategic Plan**
  - ◆ Enterprises as involved customer/funding source
  - ◆ Performance measurement (In-house/Acquired)
  - ◆ Software Strategic Plan (Manage/Assure/Improve)
- **Strategic Goals of Project Goddard**
  - ◆ Expanded team structure across all mission phases
  - ◆ Focus on end-to-end information systems
  - ◆ ISO 9001 certification
- **New Organizational Structure Proposed**
  - ◆ Software responsibility & expertise in single organization
  - ◆ Significant infrastructure assets

Leveraging SEL Experience

- Building an improvement organization
  - Understand/characterize new domain elements
  - Use SEL infrastructure (approach/measurement)
- Studying end-to-end software systems
  - Model effort/ schedule/ errors
  - Develop reuse assets (process & product)
- Transferring technology based on domain characteristics
  - Internal & external transfers
  - Tailor development, integration & maintenance practices

Organizational Adaptation

■ **Drivers for Change**

■ **Organizational Adaptation**

  ◆ SEL Structure

  ◆ Work Planning Approach

  ◆ SEL Infrastructure

■ **Experimentation Adaptation**

■ **Technology Transfer Adaptation**

■ **Next Steps**

SEL Structure (Near-term Concept)

Project/Technology Teams

Staff level: 1000+
Function: Develop/
integrate/maintain
software systems

NASA & CSC+ ?

Measures →

← Refined
Process

Process Analysts

Staff level: Core 10-12
+ additional from project
Function: Design studies
        Perform analysis
        Refine process
NASA & CSC & UM + ?

Database Support

Staff level: 2-3
Function: Process, QA,
        & archive data

NASA & CSC

SEL
Data Base

Asset
Library

- **Measures**
- **Reuse info**
- **S/w eng reports**
- **Project records**

Work Planning Approach - Current

government

local improvement focus

with some NASA-wide efforts

industry

consistent metrics and

management commitment

academia

turns research into

practice (case studies)

- **Board of Directors: 4-6 senior leads**
- **Annual proposals: based on local improvement goals**

Work Planning Approach - Future Concept

Team	Remain self-directed team
Partnership	Broaden to include other industry and academic partners
Board of Directors	Enterprise representation from projects

Proposals linked to organizational & sponsor goals |

SEL Infrastructure - Current

- ■ **Experience Repository**
  - ◆ Increased measurement database capabilities
    (e.g., COTS process & product data)
  - ◆ Online/Web-based data collection tools
- ■ **Project Support**
  - ◆ Earlier team participation (requirements generation)
  - ◆ Feedback reporting

SEL Infrastructure - Future Concept

Database	Collect & analyze: team-specific activity data acquisition-related data
Project Support	Model effort/ schedule/ errors for: development, integration & maintenance Online report distribution

Experimental Adaptation

- **Study approach and selection**
  - ◆ Smaller, overlapping studies
  - ◆ Team & individual processes considered
  - ◆ Firmer link between experimental goals & measures

- **Analysis of results**
  - ◆ Faster model building
  - ◆ Feedback to current teams
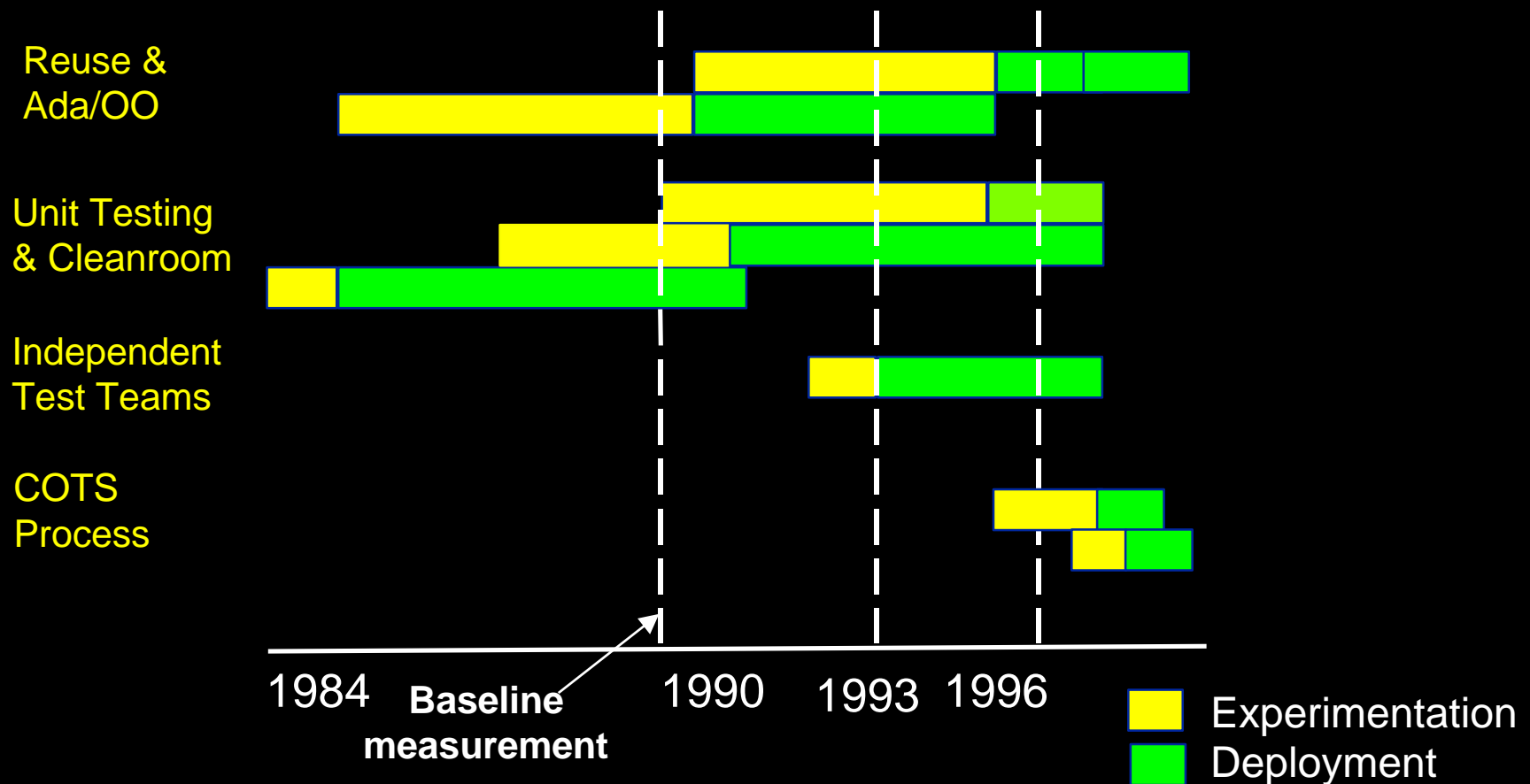 - ◆ Frequent baselines for managers

Accelerating Analysis

- **Use of qualitative techniques**
  - Focused interviews
  - Quick-look analysis
    - Interviews
    - High-level profile data
- **Interim analysis reports**
  - Online feedback replacing meetings
  - Reports build on previous

Overlapping Studies

Length of studies shortens - Baseline period decreasing

Technology Transfer Approach (through 1996)

- **Depended on answers to a few simple questions**
  - ◆ Scope?
    - ◆ Integrate with other NASA/industry efforts
    - ◆ Base on NASA guidebooks & domain experience
  - ◆ Sponsor?
- **Transferred products**
  - ◆ Guidebooks, training
  - ◆ Tools

Technology Transfer Approach Evolving

- Domain-based "filter"
  - Consider a range of factors
    - Organization, environment
    - More questions at the start
  - Predict success of transfer
  - Pilot in place at JSC
- Integrate with other NASA/industry efforts
  - Filter best practices quickly
  - Use existing process/product improvement groups

Next Steps for the SEL

1. Baseline/profile expanded organization

    ◆ Processes used

    ◆ Products generated

    ◆ Report to organization

2. Select projects for focused support

    ◆ Development/integration/maintenance

    ◆ Process technologies (ongoing work)

3. Evolve SEL direction

    ◆ Enterprise representation

    ◆ Investigate other partnerships

SEL Activities Within Project Goddard

Iterate

Package
- Online feedback
- Interim reports

Assess
- Systems - COTS/reuse
- People - team & individual

Understand
- Characterize/survey expanded organization
- Develop management models